

DOCUMENT RESUME

ED 182 938

EC 123 186

AUTHOR Frostig, Marianne
 TITLE Perceptual Training, The State of the Art.
 PUB DATE Oct 78
 NOTE 40p.: Paper presented at the International Seminar on Learning Disabilities (Guadalajara, Mexico, October 12-15, 1978)
 EDRS PRICE MF01/PC02 Plus Postage.
 DESCRIPTORS Early Childhood Education: Evaluation Methods: Infancy: *Learning Disabilities: Perception Tests: *Perceptual Development: *Perceptually Handicapped: *Teaching Methods: *Visual Perception

ABSTRACT

The author discusses the role of perceptual training in the education of young perceptually handicapped children. Distinctions are drawn between perception and awareness, and the necessity of stimulation to encourage infant and child learning is emphasized. Commonalities between perception and learning are underscored. The author stresses that perceptual training should continue with retarded and learning deficient children as long as improvement in perceptual skills is observed. The evaluation of visual perception through the Marianne Frostig Developmental Test of Visual Perception is discussed in detail, and other approaches to perceptual assessment are considered. (CL)

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ED182938

August 2, 1978

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Lecture #289

PERCEPTUAL TRAINING, THE STATE OF THE ART

Marianne Frostig, Ph.D.

For Presentation: Sweden
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PERCEPTUAL TRAINING, THE STATE OF THE ART

Marianne Frostig, Ph.D.

We must first agree, ladies and gentlemen, on what we mean by the word "perception." There are so many definitions that we could spend an hour enumerating them and perhaps expanding on them. For the purpose of this lecture, I will choose a definition formulated by Professor T. G. R. Bower (1977), formerly of Harvard and now professor of psychology at Edinburgh, Scotland. He states: "Perception ordinarily refers to any process by which we gain immediate awareness of what has happened outside ourselves."

Visual perception mediates the bulk of experiences related to the outside world in the sighted human being. Together with auditory perception, visual perception is the means of perceiving distant events. Tactual and haptic* perception can deal only with proximal events; visual and auditory perception are the bridges to understanding the world around us.

* Haptic perception refers to the simultaneous functioning of tactile and kinesthetic perception.

Bower, T.G.R. The perceptual world of the child. Cambridge, Mass.: Harvard University Press, 1977.

Visual perceptual skills play a part in nearly all behavior of the sighted person.

James Gibson (1966) defines perception in this way:

"Perception is extracting information from stimulation."

Therefore Gibson does not exclude internal stimulation.

Bower's definition clearly differentiates perception of the outside world from awareness of ourselves. We are aware of our feelings, ourselves and our knowledge.

But Professor Bower does not regard these forms of awareness as being the equivalent of perceptual processes.

The differentiation between awareness and perception is not easy nor do words differentiate between these processes. The Germans, for instance, use awareness for designating perceptual processes directed toward the outside world as well as for the awareness of the inner life. In the English language, the differentiation is not always clear. But we

J. J. Gibson. The Senses Considered As Conceptual Systems
Houghton-Mifflin, 1966.

usually speak about awareness when we refer to thoughts, feelings, and so on (in other words, to our interior world). When we talk about sensations from the body, we are aware of such things as pain, feelings from internal organs such as from a full stomach, sensation of temperature, and so on. When we talk about receiving stimuli from the outside world, we usually use the term perception.

The distinction between perception of the outside world and the awareness of the body is important. It is often overlooked that children have to learn about both sources of information--about sensations which emanate from the body and about the stimulation which comes from the outside world. The awareness of the body is necessary for the most primitive forms of adaptation and actions, for sucking and grasping and swallowing. Awareness of the body as well as perception of the environment are needed for motor planning and for the execution of all conscious movements (Luria, 1973;

Bernstein, 1967). Threading a needle, turning a screw, hitting a nail with a hammer, rigging the sails on a boat, running an obstacle course, and so on depend on visual perception in the sighted individual.

For the infant and toddler, any movement is new and has to be learned, but all through life no conscious and directed movement is possible without awareness of the part of the body to be moved, of its relation to other body parts, and of its position in space, as well as any change in position and muscular tension during the progression of the movement (Luria, 1973; Bernstein, 1967).

As already mentioned, awareness is a characteristic of infant behavior. But the infant does not perceive, because the stimuli have little or no meaning. The visual cortex is not yet functioning, and the awareness of the

Bernstein, N. The Coordination and Regulation of Movement.
New York: Pergamon Press, 1967.

Luria, A. R. The Working Brain. New York: Basic Books, 1973.

outside world and of the stimuli from his own body are not yet clearly differentiated. The infant senses warm or cold; he is aware of being comfortable or uncomfortable; but he can not perceive the sources of these feelings. With very severely retarded children, this is the level at which training must start.

The previous discussion of perception may not help the lay person to understand what perception means. But it is important that parents understand. They may think that it refers to eye-sight, but perception occurs in the brain, not in the eye.

Let me give an example of perceptual processes with which we can explain the word to lay people and parents. One may show that  is perceived as a line;  as two lines;  as 3 lines or the letter U;  as a square. That we perceive the four lines as a square is not an ocular function, but a function of our brains.

The terms denoting psychological concepts are rarely precise and circumscribed. The borders between such concepts as sensation, awareness, perception, and concept are fluid.

Perception can also be defined as the ability to recognize stimuli and to differentiate between them (Frostig, et al., 1972). These definitions--Bower's, Gibson's, Frostig's--tell little about the various processes involved in the perceptual act: attention, reception in the sense organs, screening of stimuli, transfer of stimuli to the central nervous system, analysis of information, storage, and corrective feedback. These processes are among those indispensable for the cognition of the outside world.

It is necessary to know about these processes which are involved in perception, because when perception is deficient, it may be because one or another of these

processes is disturbed and has to be remediated. This knowledge is not self-evident, because these processes are not conscious and must be inferred. We are, for instance, unaware of the way we screen stimuli. Screening is necessary because so many stimuli impinge on us at every single moment. We receive and test them and become aware of some but remain unconscious of others. In children with learning difficulties and in retarded children, this screening function (Broadbent, 1958) is deficient. As a result, these children do not focus their attention on a stimulus. Cruickshank (1975) has suggested restricting the input from the environment, and eliminating all unnecessary stimuli while the child is working. Another

Broadbent, D. W. Perception and Communication. New York: Pergamon Press, 1958.

Cruickshank, W. M. The Learning Environment. In W. M. Cruickshank and D. P. Hallahan (Eds.), Perceptual and learning disabilities in children. Vol. 1 Psychoeducational practices. Syracuse, N. Y.: Syracuse University Press, 1975.

educational method to improve scanning functions is Meichenbaum's (1977) cognitive-behavior modification, which consists of helping the child to achieve control over his behavior through speech and implicit speech (thought). Movement education, relaxation therapy, and also perceptual training can serve the same purpose.

Classification is also implied in perception. "This is a chair" implies that we include the chair into the class of chairs. The ability to classify, which is so important in the formation of concepts and in thought processes, is therefore also delayed when the perceptual deficit is severe. Classification therefore has to be developed carefully through educational methods.

All perceptions involve discovery, and are necessary for simple as well as for advanced problem-solving. It may seem strange to assume that discovery is involved in perception. But think only of the infant and the young

Meichenbaum, D. Cognitive-behavior modification. New York: Plenum Press, 1977.

child. He has to discover the whole world for himself. He has to find out that things look differently and that they serve certain purposes, and that they can change (as water to ice, a dry cloth to a wet one, a piece of meat to a stew, a cloud to rain, a seed to a plant, a baby to a big person). Becoming aware of changes is the first step to wanting to know why things change; and as the world seems to be full of riddles and wondrous occurrences, the two-year-old toddler can not stop asking "why?", "why?" "why?" The learning-deficient and the retarded child may not become aware of changes; and even if he becomes aware that something has changed, he still may not perceive what the specific changes are and therefore he will not explore nor discover, and he will not learn.

Visual perception is also necessary for various forms of communication including reading and writing (with the exception of Braille). It assists oral communication because it permits

perceiving the speaker's gestures, facial expression, and stance. Language can not develop without the perceptions of the outside world. Perceptual skills should be developed together with language functions. Perceptions are what can be talked about, what can be communicated. Ideas and thoughts can not be formed and therefore not expressed without previous perceptual experiences.

Language, on the other hand, enriches perceptions.

Language clarifies what we perceive. The labels we attach to our perceptions and the relationships we express through language make it possible to understand and remember better what we perceive.

Still the child relies less and less on perceptual experiences as he grows older. He builds on them and adds to them visualization, memory and knowledge. These transformations of experiences can substitute for them during the later school years and in adult life. This is not possible for the infant and for the preschooler.

Our previous discussion has indicated that what the child learns about himself and the world around him --indeed, all stimulation that he receives -- depends on direct contact with the outside world and on the range and richness of his experiences. The infant's development will therefore depend to a great extent on the stimulation he receives during these early periods.

Many cultures provide for such stimulation. The baby who is carried by the mother on her back or in a sling and supported by her arm receives kinesthetic and vestibular and tactile stimulation, as well as a great deal of visual and auditory information from a world of ever-changing sights and sounds. Even the infant in a baby buggy experiences its movement, hears sounds, and can look around when propped up. He does not suffer from a lack of stimulation which could handicap his further development.

But there are environments which deprive a baby of the necessary stimulation. In some hospitals, orphanages, and day care centers, infants may be isolated from stimulation.

They may have no contact with their caretakers except during feeding, diapering and bathing. They may have to stay in their cribs at an age when children outside the institution toddle happily around. They may see little that is new and exciting. Even the child who can return from a hospital to his own home may continue to live under restrictive conditions. Because he is often still weak, he may be left alone nearly all of the time so that he can rest and be protected.

Early stimulation is important; without it the brain cannot grow and develop normally. This insight has been gained from animal experiments; from observation of hospitalized infants, and from the warped development of institutionalized children. It has resulted in the development of programs of infant stimulation as a preventive strategy. In many countries, infants, toddlers and preschool children partake in special enrichment programs, with the mother or without her, in their own homes or in special centers.

Physical handicaps may also deprive the young child of stimulation and information. The handicap may be visual (blindness or poor vision); it may be auditory (deafness or hard of hearing); it may be a motor handicap (for instance, lack of a limb or a necessity to wear braces to support flaccid muscles); or it may be a chronic health problem (for instance, the child's movements may be restricted because of a cardiac problem).

In these cases, stimulation adapted to the child's handicap may prevent retardation. The child who can not see needs auditory and haptic stimulation. The adults should move for the child when the child cannot move by himself so that the child can observe the consequences of these movements. He may observe, for instance, what happens when the paint brush smears the colored liquid around on the paper or what happens to the cereal when the caretaker puts white powder (sugar) on it. He may observe that the taste changes in a most satisfying way.

He may become aware of what happens when somebody pushes the little toy boat which rests on the water in the bathtub, and so on. But any time the child can and is permitted to do something by himself, he should act by himself, even if he has to use his nose for pushing the toy boat.

The deaf child too is in need of visual and haptic stimulation to replace the lacking auditory information. Sylvia Farnham-Diggory (1972) suggests that the deaf child should learn sign language in addition to oral language so that he can freely communicate with his deaf age-mates. The opinions concerning the teaching of sign language are diverse. I believe that Farnham-Diggory's point of view, that sign language should be taught, is correct, because oral language is only acquired slowly by the deaf child, and when language experiences are missed during the early years, the development of cognitive and communicative abilities is retarded.

Farnham-Diggory, S. Cognitive processes in education.
New York: Harper & Row, 1972.

Most of you who work with children directly will work with children of preschool age or school age. You may wonder if visual or auditory perceptual training is always indicated, especially as I have stated that children become less dependent on direct perception as they grow older. You may also ask if the child's ability to learn will improve through perceptual training. Other questions you may pose are: Can one help the child who has become retarded because of lack of stimulation during the earlier years? When should visual perceptual training be emphasized? What form should this training take? I will try to answer these questions.

(Perceptual Development during the Preschool
and Early School Years)

Piaget has referred to the years between the ages of about $4\frac{1}{2}$ to $7\frac{1}{2}$ years as the intuitional phase of development. He referred with this phrase to the child's way of learning about the world around him, which is at this time direct and observational. During the beginning of this period, the child has little ability to ponder about his perceptual experiences and to correct wrong perceptions. Something which looks bigger is thought to be bigger; something which looks to be "more" is "more"; the meadow with the cows slides back when the car moves; and the moon is a kind companion who walks with you when you walk.

Only with continued experiences and the development of his central nervous system does the child learn to be critical in regard to his perceptions and to correct nonveridical perceptions. Thought processes begin to develop during this period, but most learning is perceptual. Visual perceptual

training is therefore necessary during this period, when most information is received through the senses. The awareness of the importance of visual perceptual training during the preschool years predates research findings. The great educators of the past knew that the child learns during this period through perceptual experiences. Froebel in Germany, Pestalozzi in Switzerland, and Montessori in Italy were among those educators who studied the young child's behavior and developed methods and materials to improve perceptual abilities. Perceptual training is also needed during the beginning school years. All abilities should be developed maximally-- language, sensory-motor functions and perceptual abilities.

Some educators do not share this point of view. The difficulty in reaching a consensus is probably a semantic one, at least in part. The term "ability" may be defined differently. If the term "ability" is understood as denoting a static or purely genetically determined characteristic, then training would be superfluous. "Ability" in the sense

in which it is used here could also be expressed by the phrase - "developed function." To give examples: the tight-rope walker has to improve his ability to balance his body on a rope; the airplane spotter has to improve his ability to discriminate types of airplanes; the laboratory technician has to improve his ability to discriminate various kinds of cells in the blood. Perceptual skills require learning; and vice versa, learning requires perceptual skills. The same processes required for perceptual tasks are also required in learning: perception of stimuli, selection of stimuli, registration in the central nervous system, storage in memory, attention, etc. Whenever perception is inadequate, learning is inadequate also. Whenever learning is inadequate, perceptual processes tend to be affected.

Piaget (1966, p. 79) has commented: "It would be difficult to say just where perceptual activity ends and intelligence begins. This is why nowadays we cannot speak about intelligence without defining its relation with perception."

Piaget, J. The psychology of intelligence. Totowa, N. J.: Littlefield Adams, 1966.

Many scientists believe that the main cause of learning disabilities are perceptual deficits. This was also the opinion of the task force in learning disabilities under the direction of Professor Hobbs (1975) in the U.S.A.

Visual Perceptual Training and School Training

Perceptual training can also improve school learning. Activities during perceptual training may also train those skills which are required in learning fundamentals. The skill of drawing straight, curved, or angled lines will be easily transferred to writing skills. The ability to find figural information (detail) on a crowded page will assist in scanning a text to find specific information. Practice in the perception of position in space may make it easier later on to discriminate between such letters as "d" and "b" and so on.

Professor Cruickshank (1975) has suggested replacing the term "learning disability" with "perceptual disability." This point of view indicates that the exploration of perception

Hobbs, N. (Ed.) Issues in the classification of children.
Vols. 1 and 2. San Francisco: Jossey-Bass, 1975.

in children with learning disabilities is a pre-eminent task for the researcher in special education, and that it is equally important for the teacher of children with learning disabilities to assist the children in improving their perceptual skills.

There is another commonality between perception and learning which has not yet been mentioned. Perceptions are involved in all adaptations to the environment, and so is learning. Both perception and learning are necessary for survival. Both are adaptive processes. Eleanor Gibson (1970, p. 242) wrote that perception is as much an adaptation process as the development of locomotion, and that "fine-grain differentiation of multi-dimensional complex set of objects is high in the evolutionary scheme and in development, a process where adaptation is achieved only through education."

Eleanor Gibson. The Development of Perception, An Adaptive Process. American Scientist, 1970. No. 58, pp. 98-107.

I have not yet answered another question which I posed earlier. Can one help children during the later school years to improve perceptual functions? Is it not too late?

Stella Chess, a physician, treated children with severe and varied handicaps which resulted from their mothers having contracted rubella during pregnancy. These children suffered from visual, hearing, and cardiac defects. Neurological findings revealed focal and nonfocal signs, seizures, clumsiness, tremors, and other symptoms. During preschool age, 37.4% of these children showed mental retardation; and of these numbers, more than 17% were severely or profoundly retarded. While the children's physical defects did not improve, the intelligence of this group showed a decided upward trend as they grew older. At age 8 to 9 years, only 25.7% were retarded (as compared with 37.4% during preschool years), and only 11.4% were severely or profoundly retarded

as compared with over 17% during the preschool period.
Stella Chess, M.D. "The Plasticity of Human Development,
Alternative Pathways." Journal American Academy of
Child Psychiatry, 1978 17 pp. 80-91.

This study is one of many which indicates that perceptual training should continue with retarded and learning deficient children as long as they can improve their perceptual skills. Improvement can be observed in children during the prepubertal phase, and in some even later.

I come now to the question of the form perceptual training should take; and as time is short, I will restrict myself to visual perceptual training.

An analysis of perceptual tasks into components is necessary for optimum perceptual training. Imagine, for instance, a child who cannot focus attention. He will certainly fail on many perceptual tasks. Another child whose eye movements are very disorganized and erratic and who cannot perceive the relationships of objects in the outside world or in a picture, will also show inadequate perceptual skills. But the skills these two children will have to learn and to practice will differ. It is therefore important to differentiate between their deficits. Analysis of the deficits is necessary

for optimum results. The more complex the task, the more abilities are needed for its performance.

I will now show some examples of tasks which require different abilities.

For instance, the perception of the difference between a heptagon and a pentagon requires a relatively high

(Slide) degree of form perception.

(Slide) In this next drawing, you see identical shapes, but the child has to differentiate between their positions in space.

(Slide) In the next slide, you will see a task in which a child has to judge the spatial relations of the shapes on the picture. This last exercise also requires the ability to carefully scan the area and to compare each part of each picture with the standard. The perceiver must keep details in mind while comparing these details with the whole.

The abilities which are necessary in solving the described tasks are evaluated with the Marianne Frostig Developmental Test of Visual Perception.

The Marianne Frostig Developmental Test of Visual Perception (DTVP)

The perceptual training program we published is based on the findings of the Developmental Test of Visual Perception. I will discuss this test before speaking more about visual perceptual training. The test evaluates five perceptual abilities which are of importance for school learning and adjustment.

A few words concerning the construction of the test.

I did not begin with analytic studies or a model, such as that used by the developers of the Illinois Test of Psycholinguistic Abilities, or the ITPA (Kirk, McCarthy, and Kirk, 1968).

The DTVP was developed from observation of children, and especially from observing the development of new abilities as the child grows older. A variety of problems in learning suggest that a variety of abilities exist within the field of visual perception; for instance, Cruickshank and his co-workers (1957) found different kinds of visual perceptual disturbances among

cerebral palsied children.

Kirk, S. A., McCarthy, J. J. and Kirk, W. D. The Illinois Test of Psycholinguistic Abilities. (Rev. Ed.) Urbana: University of Illinois Press, 1968.

The test items are sequenced along an easy-to-difficult continuum in each of the five subtests and were chosen to interest children in the 3- to 9-year-old age range. The test can be administered to individuals or to small groups of children in less than an hour.

Our findings show that the subtests are relatively independent of each other. In general, the size of the correlations among the subtests tends to diminish with advancing age. This is probably due to progressive differentiation of perceptual abilities. It could be congruent with Werner's theory (1957) that the development of mental functions proceeds with increasing differentiation and progressive hierarchization.

For children with difficulties in learning, we can always add to the DTVP subtests some other tests of visual and sequential

Werner, H. Comparative psychology of mental development (Rev. Ed.)
New York: International Universities Press. ;957.

memory. We use for this purpose subtests of the Wechsler Intelligence Scale for Children - Revised, or the WISC-R (Wechsler, 1974), and the ITPA.

I want now to discuss the subtests of the DTVP in a bit more detail.

Eye-hand coordination (Subtest I) tests a restricted area of motor skills. The child is required to draw continuous, straight, curved, or angled lines. The scores on this subtest "predict the child's ability to do printing, writing, and such activities as pasting and copying designs." Subtest I, however, has a low correlation with beginning reading.

It is important to observe the left-right progression of eye movements during these tests. Observation of children who have difficulties in this area shows that they usually have writing difficulties. The subtest has low reliability, because motor tests in general have low reliability.

Wechsler, D. Wechsler Intelligence Scale for Children-Revised.
New York: The Psychological Corporation, 1974.

The figure-ground perception subtest taps the ability to pay selective attention to one part of the visual field (the figure) while other parts become the background (the field). The figure-ground subtest (subtest II) requires the child to discriminate between intersecting figures and to find hidden figures. This subtest correlates relatively low with beginning reading in samples of "normal" children on the average, but disabilities in figure-ground perception are nevertheless present in children who are severely handicapped in reading. Many children with difficulties in this area also have poor eye movements. Figure-ground abilities are necessary for such tasks as finding specific information on a page, dictionary work, finding a number in the telephone book, and so on. Abercrombie (1964) has found that difficulty with hidden figures on this subtest is highly correlated with strabismus--when children do very poorly on Items 7 and 8 of this subtest, an eye examination may be indicated.

Keogh (1971) has reported the results of several unpublished studies indicating that children with learning difficulties appear to have deficits in what she calls perceptual organization, referring to relative difficulty in separating the field (i.e., what is important) from the ground (that is, what is not important). In other words, these studies indicate that children with learning difficulties are highly likely to have difficulties in figure-ground perception. Keogh reports that within these studies reading ability is correlated with the ability to ignore the irrelevant features of a stimulus display, that kindergarten children at high risk for school failure are less able to ignore irrelevant features of a stimulus display than children at low risk for failure, that learning-disabled children appear to be more field dependent than nondisabled children, and that severely learning disabled children are more impulsive and make more erroneous decisions quickly than nondisabled children.

Subtest III (Form Constancy) requires that the child recognize and discriminate geometric figures presented in a variety of sizes, shadings, textures, backgrounds and perceptions. Constancy refers to the ability to perceive an object as belonging to a certain class, regardless of size or color or from which angle it is viewed. A square is recognized as a square, despite the changes in the stimuli impinging on the retina associated with changes in size, distance, direction, angle of viewing and changes in the surrounding field or context. Subtest III has a medium high correlation with beginning reading.

Subtest IV, Position in Space, involves the discrimination of rotations and reversals in rows of similar figures. This subtest has poor reliability, because there are only eight items and possibility of guessing is high. The subtest calls for recognition of differences and similarities, and does not require that the child remember the standard stimulus. For instance, a child may be able to say if "b" and "d" are the same or different, but may not be able to tell which letter is "b" and which "d", or will confuse the letters when he is not able to compare them.

The ability to perceive position in space develops earlier and reaches its maximum earlier than does the ability to perceive spatial relationships. There is a medium high correlation between scores on the position in space subtest and beginning reading.

Subtest V, Spatial Relationships, refers to the ability to recognize the reference point of objects to each other or their position in relationship to one another. Perception of spatial relationships differs from figure-ground perception in that in spatial relationships, the visual field is not divided into two parts (figure and ground), but into a number of parts. Spatial relationships differs also from position in space; position in space refers to the perception of orientation to the observer, spatial relationships to the perception of orientation of objects to each other.

Subtest V has a medium high correlation with beginning reading.

(Show reading mistakes and math mistakes frequently made by children with

difficulties in Subtest V.)

The standardization of the DTVP produced data which supports Piaget's contention that maximum development of visual perceptual abilities occurs between the ages of about 4 to 7½ years.

Correlations between the perceptual quotient (the deviation scale score for the entire DTVP), and ratings of classroom adjustment are very high, as they are for ratings of motor coordination and for teachers' estimates of intellectual functioning.

The DTVP correlates .74 with the Primary Mental Abilities test for kindergarten children. For first graders, the DTVP correlates with the WISC Verbal IQ .18; with the WISC Performance IQ .44; and with the Full Scale WISC IQ .34.

The correlation of the DTVP with the Metropolitan Reading Test is .70. Such high correlations occur because the Metropolitan test, and other tests which use workbook format (such as the Primary Mental

Abilities test, require a high degree of visual perceptual abilities.

The correlation of DTVP scores with Arithmetic achievement scores was only established with retarded children; for this group it was .73. We are quite sure the correlation between scores on the DTVP and arithmetic achievement scores for all children is higher than that between the DTVP and reading scores.

I will now discuss additional measures in the evaluation of perceptual skills. The areas we have described in some detail -- the abilities to differentiate between figure and ground, between shapes, positions in space and spatial relationships--are necessary for the learning of school tasks and for orientation and adaptation in ordinary life situations. But it is equally important for the child to remember what he saw or heard. Subtests of the WISC and of the ITPA are always added to the DTVP to test these memory skills. (Describe subtests)

Severe deficits in the memory for sequences may hamper the understanding of what has been read because the child

can not remember the beginning of the story when he reads the conclusion, or may have forgotten what he read in one paragraph when he reads the next one. Broadbent (1958) states that sequential ability, sequential perception, thought and language are the most important abilities which differentiate human beings from animals. Accurate visual and auditory perception are of course necessary for accurate remembering. What has not been perceived can not be remembered.

There are also other human abilities which are based on perception. One such skill is visualization or imagery. Köhler seemingly differed with Broadbent because he was of the opinion that visualization or imagery was the most important human characteristic. Without imagery, mental operations (that means Denk processes) are not possible, or at least very restricted.

Broadbent, D. W. Perception and communication. New York: Pergamon Press, 1958.

Köhler, W. Gestalt psychology. New York: Liveright, 1929.

I said that Köhler only seemingly disagreed with Broadbent. Visualization and sequential thinking are highly related. One can't retrieve information from one's store of memories without visualization. Imagine, for instance, that someone would ask you: What furniture do you have in your room? What kind of flowers do you have in your garden? You certainly would visualize part after part of your room to remember what furniture you have in the room; and you would have to survey in your mind your garden to enumerate the flowers.

Imagery can be tested and is indeed explored in various contexts in the already-mentioned ITPA and the WISC, but the teacher can observe the child's ability to visualize when she asks simple word problems in arithmetic, monitors the child's ability to follow directions, asks him to show with gestures what he has seen, and so on.

Children who lack imagery (or, as we express it in colloquial language, who are lacking in imagination)

show a great lack of creativity and problem-solving ability.

Corrective measures for children with difficulties in imagery and for those with difficulties in sequential behavior therefore emphasize training in visualization. You may engage such a child in the previously mentioned activities, or have him look at things and then with closed eyes report what he has seen.

If the child learns to handle information sequentially he will be able to remember much larger amounts of information.

If exercises require accurate reproduction, memory is emphasized; but if the child is asked to produce a new pattern or story or other product, creative imagination will be encouraged.

The issue has been raised in the literature as to whether it might not be more efficient to teach reading and writing directly than to attempt to develop such basic psychological functions as perception. The ability to recognize a geometrical figure, such as a square, may not be related directly to reading, although the ability to discriminate the orientation of figures, say of a "b," may be related to the orientation of a triangle. The basic abilities acquired in visual perceptual training, however, are exactly those required for learning to read and write--to pay attention to the shape and orientation of figures, to see angles, curves, open and closed forms, and other distinctive features as discussed by Gibson and Levin (1975).

The main goal of perceptual training, however, is not primarily the enhancement of academic skills. It is to help the child become aware of and sensitive to the world around him. Only by employing his perceptual abilities

Gibson, E. J., & Levin, H. The psychology of reading.
Cambridge, Mass.: MIT Press, 1975.

can the young child learn and discover. Perceptual training furthers the child's cognitive strategies he needs later on: attention, visualization, following a model, analyzing a task, and so on. These strategies are best introduced in the form of perceptual training during the preoperational phase when perceptual abilities, especially in relation to two-dimensional presentation, develop maximally. Children with a delay in perceptual development benefit from this form of training for a longer time.